## Claims

1. Reactor for carrying out photocatalysed reactions in liquid or gaseous reaction media, consisting of a reactor vessel with a solid photocatalyst, feed lines and take-off lines, mixing means, and a means of supplying electromagnetic radiation, **characterized** in that phosphoresent particles are present which are suitable for absorbing the electromagnetic radiation and, with a time delay, for emitting light which excites the photocatalyst.

2. Reactor according to Claim 1, **characterized** in that the radiation source is mounted on a radiation-transparent wall or in the interior of the reactor vessel and the mixing means is suitable for conveying the phosporescent particles from the interior of the reactor vessel to the radiation source and back.

3. Reactor according to Claim 1, **characterized** in that the means of supplying electromagnetic radiation is composed of a lamp and a fluid channel which communicates with the reactor vessel via transport lines and conveying means for the phosphorescent particles.

4. Reactor according to Claim 3, **characterized** in that the lamp is of rod-shaped design and is surrounded by the fluid channel in the form of a jacket.

5. Reactor according to Claim 3 or 4, **characterized** in that the reactor vessel is provided with means for separating the phosphorescent particles from the photocatalyst and/or from the reaction medium.

6. Reactor according to Claims 1 to 5, for the oxidation of organic impurities in water or wastewater, **characterized** in that feed lines are provided for air or oxygen and exhaust lines for the waste gases.

7. Reactor according to Claims 1 to 6, **characterized** in that the reactor vessel is a fluidized bed reactor, a continuous-flow or tube reactor, a fixed bed reactor or a stirred tank reactor.

8. Reactor according to Claims 1 to 7, **characterized** in that the photocatalyst have a particle diameter of from 1 nm to 100 μm in suspension reactors or from 1 μm to 1 mm in fluidized-bed reactors or fixed-bed reactors.

9. Reactor according to Claims 1-8, **characterized** in that the phosphorescent particles have a phosphorescence half-life of from 5 seconds to 30 minutes and a particle size of from 1 nm to 1 mm, preferably from 10 μm to 0.5 mm.

10. Phosphorescent particles for use in reactors according to one of Claims 1 to 9, **characterized** in that they consist of a phosphorescent material which has been applied to a support having a particle size of from 1 nm to 1 mm.

11. Phosphorescent particles according to Claim 10, **characterized** in that the support consists of magnetic material.

12. Phosphorescent particles according to Claims 10 or 11, **characterized** in that the support is covered with a radiation-transparent layer.

13. Process for carrying out photocatalytic reactions, **characterized** in that solid photocatalysts are suspended in a liquid or gaseous reaction medium or applied to a surface and are activated by means of phosphorescent particles which are charged up at an electromagnetic radiation source and which emit this energy with a time delay.

14. Process according to Claim 13, **characterized** in that after emitting their energy the phosphorescent particles are conveyed past the radiation source again and recharged.

15. Process according to Claim 14, **characterized** in that the phosphorescent particles are separated from the photocatalyst and/or from the reaction medium before being passed to a separate radiation source and activated, before being then passed back into the reaction medium.

16. Process according to Claims 13 to 15, **characterized** in that the photocatalytic reaction is an oxidation of organic compounds in aqueous solution.

17. Process according to Claims 13 to 16, **characterized** in that the catalyst is $TiO_2$ particles and the phosphorescent particles are glass particles which have been doped with rare earth elements and can be excited with UV light or visible light.